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May 31, 1977

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**\*\* See image for Certificate of Correction \*\***

TITLE: Peracid treatment of dry cleaning baths

DATE-ISSUED: May 31, 1977

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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US-CL-CURRENT: 210/759; 8/141, 8/142

## CLAIMS:

What is claimed is:

1. A process for treating a dirty dry cleaning bath containing a solvent, a detergent which does not react with peracids, and water to permit longer operation between distillations, which comprises: agitating said dirty bath in the absence of garments with a sufficient amount of an organic peracid which is readily soluble in the bath to provide about 0.001 to 0.15% active oxygen based on the weight of the bath, and about 0.05 to 12% of a water-soluble inorganic polyphosphate salt based on the weight of water present in the dry cleaning bath, at a pH value between about 5.0 and about 9.0; filtering the bath to remove suspended dirt and fine particles; and recovering a clean dry cleaning bath.
2. The process of claim 1, wherein a sufficient amount of peracid is employed to provide about 0.002 to 0.004% A.O.
3. The process of claim 1, wherein the amount of said polyphosphate salt is about 0.3 to 2.0%.
4. The process of claim 1, wherein the pH value is between 5.0 and 6.0.
5. The process of claim 1, wherein the peracid is selected from the group consisting of perbenzoic acid, monoperphthalic acid, permaleic acid, peracetic acid, performic acid, perpropionic acid, p-nitroperbenzoic acid, and m-chloroperbenzoic acid.
6. The process of claim 1, wherein the peracid is perbenzoic acid.
7. The process of claim 1, wherein the water-soluble inorganic polyphosphate salt is selected from the group consisting of sodium tripolyphosphate, tetrasodium pyrophosphate, potassium tripolyphosphate, tetrapotassium pyrophosphate, sodium acid pyrophosphate, and glassy phosphates.
8. The process of claim 1, wherein the water-soluble inorganic polyphosphate salt is sodium tripolyphosphate.
9. The process of claim 1, wherein the bath is agitated at temperatures from

20.degree. to 55.degree. C. for about 5 to 120 minutes.

10. The process of claim 1, wherein the bath is agitated at temperatures from 25.degree. to 40.degree. C. for about 10 to 30 minutes.

11. The process of claim 1, which comprises reacting in the dirty dry cleaning bath a peroxygen compound and an activator for said peroxygen compound, said peroxygen compound being soluble in the water phase of the emulsion and said activator being soluble in the solvent phase, and agitating the bath to supply activator to the water phase where the activator is rapidly reacted with the peroxygen to form the corresponding peracid.

12. The process of claim 11, wherein the peroxygen compound is hydrogen peroxide, the activator is phthalic anhydride, and the peracid formed is monoperphthalic acid.

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TITLE: Peracid treatment of dry cleaning baths

Brief Summary Text (3):

One procedure has been described in U.S. Pat. No. 3,677,955 for postponing distillation for a sufficient time to permit substantial cost savings. The procedure involves agitating a dirty dry cleaning bath with at least 0.25% hydrogen peroxide to partially decolorize and suspend the fine particles of dirt which are subsequently removed from the bath by filtration. The bath is then reused to clean additional garments. While this process has been effective for temporarily postponing the requisite distillation operation, a process is needed to purify dirty dry cleaning baths to even higher levels so the distillation operation is postponed for even longer time periods.

Brief Summary Text (6):

The peracids employed according to the process of the invention must be a more powerful bleaching agent than hydrogen peroxide and must be soluble in a water-solvent dry cleaning bath. The peracids are added directly to the bath as preformed peracids or prepared in situ by the reaction of a peroxygen compound with a peroxygen activator. Preferred preformed peracids include perbenzoic acid, perphthalic acid, permaleic acid, peracetic acid, performic acid, perpropionic acid, p-nitro perbenzoic acid, and m-chloroperbenzoic acid.

Brief Summary Text (8):

Any in situ prepared peracid which is a more powerful bleaching agent than hydrogen peroxide which is formed reasonably fast by the reaction of the peroxygen compound and the activator at temperatures from about 20.degree. C. to 55.degree. C., and which is soluble in the water-solvent dry cleaning bath will perform adequately. The preferred procedure for preparing the peracid in situ is to admix with conventional agitation means the peroxide compound and the activator in the dry cleaning bath in a molar ratio of 1:0.5 to 2.0, and preferably 1:1 respectively. Most preferably, admixing is performed after the pH value of the bath is adjusted between 5.0 and 9.0 with a sufficient amount of an aqueous alkaline solution. Other well known procedures for preparing peracids in solution may also be employed.

Brief Summary Text (9):

The peroxygen compound must be soluble in the aqueous phase of the bath in order to rapidly form the peracid in sufficient amounts to effectively remove bath impurities. Suitable water-soluble peroxygen compounds include hydrogen peroxide, sodium perborate, sodium carbonate peroxide, sodium pyrophosphate perhydrate, zinc peroxide, magnesium peroxide, calcium peroxide, urea peroxide, and potassium caroate, with hydrogen peroxide preferred.

Brief Summary Text (13):

Suitable carboxylic acid anhydrides and mixed anhydrides include phthalic anhydride, 4-chlorophthalic anhydride, benzoic anhydride, octenylsuccinic anhydride, nonenylsuccinic anhydride, acetic anhydride, phthalic/benzoic anhydride, succinic/benzoic anhydride, succinic/phthalic anhydride, maleic/benzoic anhydride, tetrahydrophthalic anhydride, trimellitic anhydride, maleic anhydride, glutaric anhydride, acetic/propionic anhydride, 1,2,4,5-benzenetetracarboxylic anhydride, O-sulfobenzoic anhydride, azelaic anhydride, polyazelaic polyanhydride, and 3,3',4,4'-benzophenonetetracarboxylic dianhydride; with the first five anhydrides

being preferred. While acetic anhydride is suitable, it is not recommended in view of the possible formation of explosive diacetyl peroxide which may accompany the reaction between acetic anhydride and hydrogen peroxide.

Brief Summary Text (15):

Suitable reactive esters include the esters of phenols: phenyl benzoate, o-carboxyphenyl benzoate, chlorophenyl benzoate, phenyl acetate, p-cresyl acetate, and p-bromophenyl benzoate; the esters of polyhydric alcohols containing several ester groups situated on adjacent carbon atoms: mannitol hexacetate, sorbitol hexacetate, and triacetin; the esters of mono- and disaccharides containing 3 or more ester groups on adjacent carbon atoms: glucose pentaacetate, sucrose octaacetate, fructose pentaacetate, and glucose tetraacetate; the esters having two ester groups attached to the same carbon atoms: methylene dibenzoate, trichloroethylene dibenzoate, chloral diacetate, furfural diacetate and benzaldehyde diacetate; the esters of enolic forms of ketones: cyclohexenyl acetate, and isopropenyl acetate; the esters of N-substituted hydroxylamides: such as acetylacetoxyhydroxamic acid, the esters of alcohols containing electron-attracting substituents: such as trichloroethyl acetate; the phenyl carbonate esters: such as p-sulophenyl ethyl carbonate, and the esters of cyanuric acid: such as trisacetyl cyanurate, diacetyl cyanurate, and sodium diacetyl cyanurate.

Detailed Description Text (4):

Separate 60 milliliter portions of a commercial dirty dry cleaning bath containing perchloroethylene, 1% of a nonionic-anionic detergent blend and 0.7% organic soluble soil were stirred with the formulations set forth in the Table without fabric present at 30.degree. C. for 30 minutes. The treated baths were dried to remove excess water by mixing them with 5 grams of anhydrous magnesium sulfate and then filtered to remove suspended solids. Percent light transmittance values were determined with a Beckman spectrophotometer at 500 m.mu. prior to and after treatment. A percentage increase of a few points in light transmittance is considered significant, since this is correlative with the increased number of times that the cleaning bath can be reused before the purification operation is used to reclaim the solvent.

Detailed Description Text (6):

The process of Inventive Run 1 was repeated, except that hydrogen peroxide and sodium tripolyphosphate were used in place of the in situ generated peracid. Results are set forth in the Table.

CLAIMS:

5. The process of claim 1, wherein the peracid is selected from the group consisting of perbenzoic acid, monoperphthalic acid, permaleic acid, peracetic acid, performic acid, perpropionic acid, p-nitroperbenzoic acid, and m-chloroperbenzoic acid.

12. The process of claim 11, wherein the peroxygen compound is hydrogen peroxide, the activator is phthalic anhydride, and the peracid formed is monoperphthalic acid.